

## NEW TAXA AND NEW NOMENCLATURAL COMBINATIONS IN THE UTAH FLORA

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### ABSTRACT

This paper includes the results of investigations leading to a revision of *A Utah Flora* by Welsh, Atwood, Goodrich, and Higgins, a publication whose first edition published in 1987 is now out of print. The following new taxa and nomenclatural combinations are proposed, based on plants from Utah and from northern Arizona: *Mertensia lanceolata* (Pursh) DC. var. *coriacea* (A. Nels.) Higgins & Welsh, comb. nov.; *Arenaria rubella* (Wahl) J. E. Sm. var. *filiorum* (Maguire) Welsh, comb. nov.; *Zuckia brandegei* (Gray) Welsh & Stutz var. *plummeri* (Stutz & Sanderson) Welsh, comb. nov.; *Ambrosia sandersonii* Welsh, sp. nov.; *Agoseris glauca* (Pursh) Raf. var. *cronquistii* Welsh, var. nov.; *Artemisia campestris* L. var. *petiolata* Welsh, var. nov.; *Haplopappus lignumviridis* Welsh, sp. nov.; *Hymenoxys acaulis* (Pursh) Parker var. *nana* Welsh, var. nov.; *Senecio castoreus* Welsh, sp. nov.; *Senecio musiniensis* Welsh, sp. nov.; *Erigeron sionis* Cronq. var. *trilobatus* (Maguire) Welsh, comb. nov.; *Lygodesmia grandiflora* (Nutt.) T. & G. var. *doloresensis* (Tomb) Welsh, comb. nov.; *Lygodesmia grandiflora* (Nutt.) T. & G. var. *entrada* (Welsh & Goodrich) Welsh, comb. nov.; *Lepidium montanum* Nutt. var. *claronensis* Welsh, var. nov.; *Phacelia cronquistiana* Welsh, sp. nov.; *Phacelia pulchella* Gray var. *atwoodii* Welsh, var. nov.; *Astragalus toanus* Jones var. *scidulus* Welsh & Atwood, var. nov.; *Astragalus zionis* Jones var. *vigulus* Welsh, var. nov.; *Pediomelum aromaticum* (Payson) W. A. Weber var. *barnebyi* Welsh, var. nov.; *Trifolium friscanum* (Welsh) Welsh, comb. nov.; *Mentzelia goodrichii* Thorne & Welsh, sp. nov.; *Camissonia bairdii* Welsh, sp. nov.; *Camissonia claviformis* (Torr. & Frem.) Raven var. *cruciformis* (Kellogg) Welsh, stat. nov.; *Gilia latifolia* Wats. var. *imperialis* Welsh, var. nov.; *Eriogonum corymbosum* Wats. var. *albiflorum* (Reveal) Welsh, comb. nov.; *Eriogonum corymbosum* var. *atwoodii* (Reveal) Welsh, comb. nov.; *Eriogonum jamesii* Benth. var. *higginsii* Welsh, var. nov.; *Eriogonum racemosum* Nutt. var. *nobilis* Welsh & Atwood, var. nov.; *Aquilegia grahamii* Welsh & Goodrich, sp. nov.; *Penstemon franklinii* Welsh, sp. nov.; *Penstemon humilis* Nutt. var. *desereticus* Welsh, var. nov.; *Yucca vespertina* (McKelvey) Welsh, comb. et stat. nov.; *Allium geyeri* Wats. var. *chatterleyi* Welsh, var. nov.; *Spiranthes romanzoffiana* Cham. var. *diluvialis* (Sheviak) Welsh, comb. nov.

Key Words: New taxa, nomenclature, Utah flora

### INTRODUCTION

While undertaking a revision of *A Utah Flora* (Welsh et al., 1987) many previously unrecognized taxa were discovered and several nomenclatural combinations were found necessary. They are proposed as follows, with a complete treatment of the inclusive taxa where necessary. The state of Utah is large, diverse, and portions of it have yet to be investigated thoroughly from a bo-

tanical standpoint. Some of the taxa described below have resulted from investigations by several workers in previously poorly explored regions of the state, while others have been tucked away in the herbarium, placed within closely related entities. The second edition of *A Utah Flora*, now in press, will be more inclusive than previously because of the many new taxa reported here. The novelties and nomenclatural proposals included in that flora are validated in this work.

#### BORAGINACEAE

**Mertensia lanceolata** (Pursh) DC var. **coriacea** (A. Nels.) Higgins & Welsh, *comb. nov.* [based on: automatic tautonym created by publication of *M. coriacea* var. *dilatata* A. Nels., Bull. Torrey Club 29: 402. 1902].

This is a necessary nomenclatural adjustment to bring the name of the variety in line with contemporary rules of the International Code.

#### CARYOPHYLLACEAE

**Arenaria rubella** (Wahl) J. E. Sm. var. **filiorum** (Maguire) Welsh, *comb. nov.* [based on: *Arenaria filiorum* Maguire, Bull. Torrey Bot. Club 73: 326. 1946].

This combination recognizes the affinity of *A. filiorum* Maguire with the closely allied *A. rubella* (Wahl) J. E. Sm.

#### CHENOPODIACEAE

**Zuckia brandegei** (Gray) Welsh & Stutz var. **plummeri** (Stutz & Sanderson) Welsh, *comb. nov.* [based on: *Grayia brandegei* var. *plummerii* Stutz & Sanderson, Madrono 34: 148. 1987].

This combination recognizes the broad-leaves portion of *Zuckia brandegei* within the genus.

#### COMPOSITAE

**Agoseris glauca** (Pursh) Raf. var. **cronquistii** Welsh, *var. nov.* *Agoseris glauca* var. *glauca* in foliis latioribus et integris,



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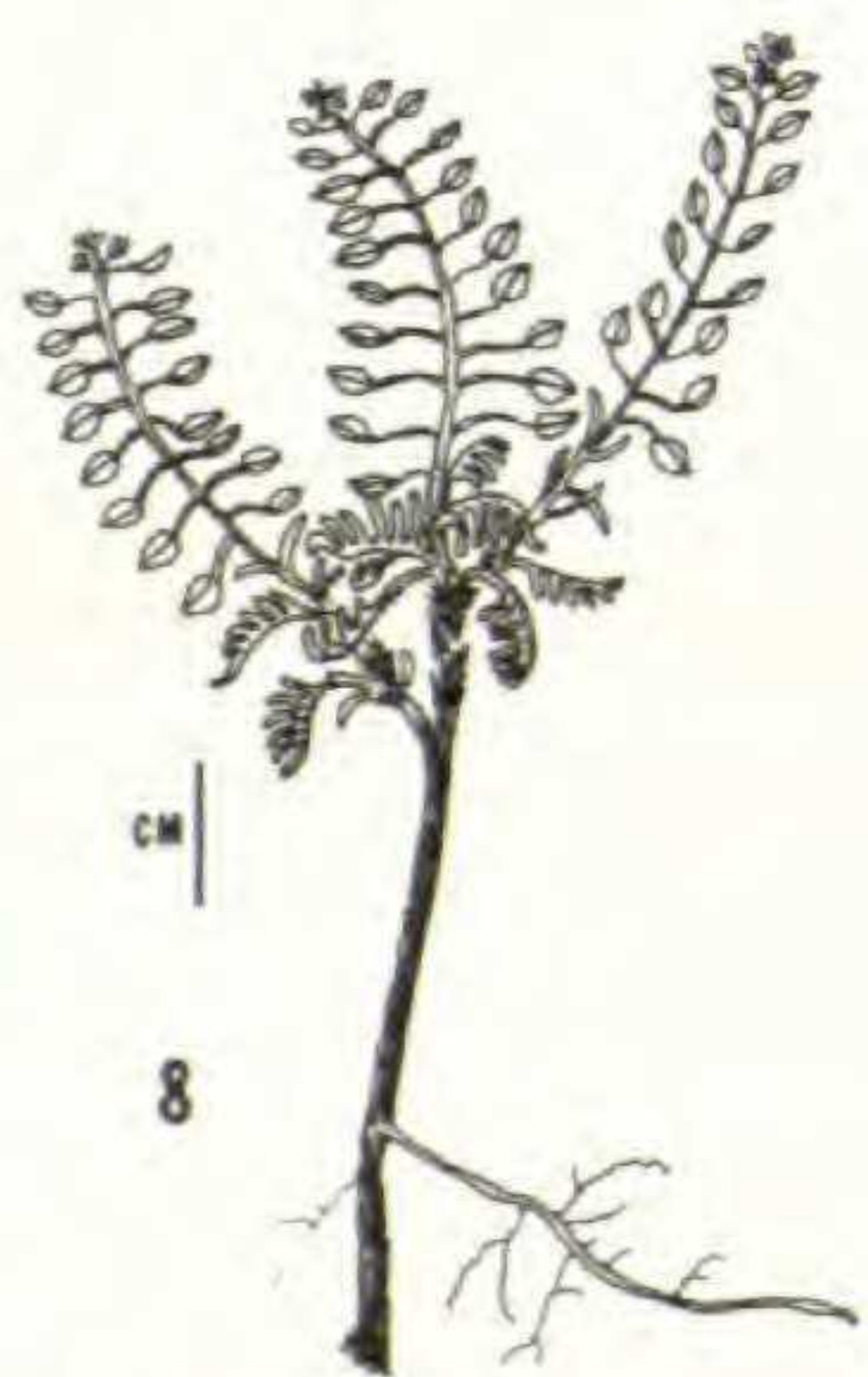
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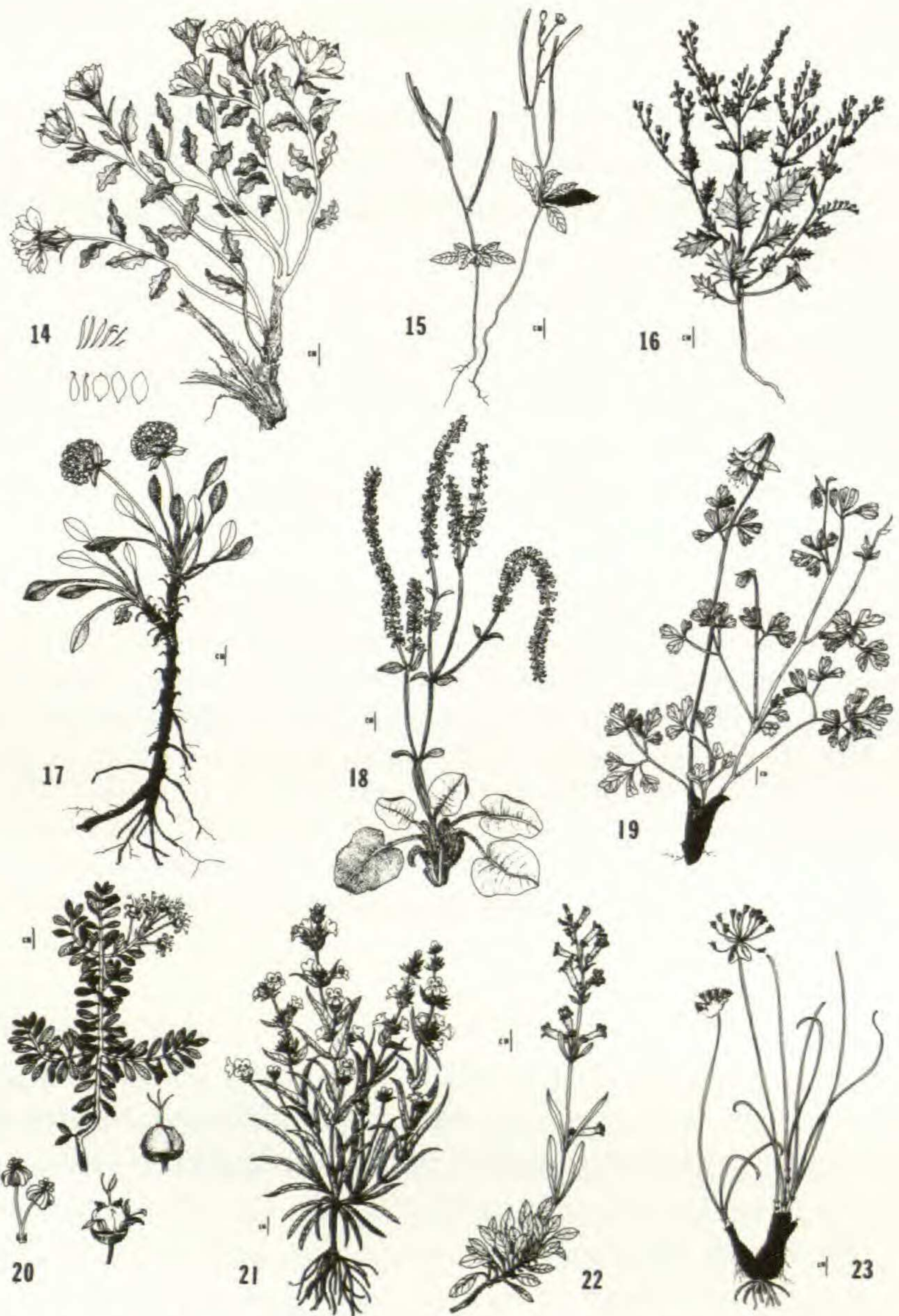
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Figures 14–23. 14. *Mentzelia goodrichii* Thorne & Welsh; 15. *Camissonia bairdii* Welsh; 16. *Gilia latifolia* Wats. var. *imperialis* Welsh; 17. *Eriogonum jamesii* var. *higginsii* Welsh; 18. *Eriogonum racemosum* Nutt. var. *nobilis* Welsh & Atwood; 19. *Aquilegia grahamii* Welsh & Goodrich; 20. *Ceanothus greggii* Gray var. *franklinii* Welsh; 21. *Penstemon franklinii* Welsh; 22. *Penstemon humilis* Nutt. var. *deserticus* Welsh; 23. *Allium geyeri* Wats. var. *chatterleyi* Welsh.

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Figures 1–13. 1. *Agoseris glauca* (Pursh) Raf. var. *cronquistii* Welsh; 2. *Ambrosia sandersonii* Welsh; 3. *Artemisia campestris* L. ssp. *borealis* (Pallas) H. & C. var. *petiolata* Welsh; 4. *Haplopappus lignumviridis* Welsh; 5. *Hymenoxys acaulis* (Pursh) Parker var. *nana* Welsh; 6. *Senecio castoreus* Welsh; 7. *Senecio musiniensis* Welsh; 8. *Lepidium montanum* Nutt. var. *claronensis* Welsh; 9. *Phacelia cronquistiana* Welsh; 10. *Phacelia pulchella* Gray var. *atwoodii* Welsh; 11. *Astragalus toanus* Jones var. *scidulus* Welsh & Atwood; 12. *Astragalus zionis* Jones var. *vigulus* Welsh; 13. *Pediomelum aromaticum* (Payson) W. A. Weber var. *barnebyi* Welsh.

statura inferiore, bracteis involucrium purpureis lineatis vel omnes purpureis; scapis pubescentibus parce pubescentibus vel glabris differt, et in montibus excelsis crescens (Plate I: Figure 1).

**TYPE:** USA. **Utah.** Piute County, Tushar Mts., T27S, R5W, S35, at timberline, ca. 3050 m, 9 mi. due west of Marysvale, on silicious modified Tertiary volcanic gravel, 27 July 1976, *S. Welsh, K. Taylor, & D. Atwood 14021* (HOLOTYPE BRY!; one isotype previously distributed as *Agoseris glauca*).

**ADDITIONAL SPECIMENS:** **Utah.** Piute County. Head of Bullion Creek, ca. 9 mi. due WSW of Marysvale, 3050 m elev., 17 August 1978, *S. Welsh & J. Henriod 18170* (BRY!); head of Bullion Canyon, 28 July 1976, *S. Welsh, K. Taylor, & D. Atwood 14056* (BRY!); ca. 10 mi. WSW Marysvale, Belknap Mt., 3355 m, 27 July 1978, *S. Welsh, M. Welsh, J. Henriod 17887* (BRY!). Beaver County. Tushar Mts., Mt. Holly, 15 August 1984, *A. Teye 3124* (BRY!). Summit County. Bald Mountain, 27 July 1978, *K. Ostler & K. McKnight 1617* (BRY!); Bald Mountain Pass, 21 August 1984, *L. C. & E. Higgins 14785* (BRY!). San Juan County. La Sal Mts., between Mt. Peale and Mt. Melenthin, 3 August 1978, *N. D. Atwood 7087* (BRY!). Sanpete County. Ferron Mt., 10 August 1988, *D. Atwood & J. Tuhy 13441* (BRY!). Uintah County. Uinta Mts., SE of Marsh Peak, 19 August 1982, *S. Goodrich 17629* (BRY!). Duchesne County. Atwood Lake Basin, 15 July 1979, *S. Welsh, E. Neese, D. Atwood 19027* (BRY!).

This dwarf alpine phase of the species occurs at elevations of 3050 m and upwards. It is a dwarf plant, only seldom surpassing 18 cm in height. Scape apices vary from glabrous to tomentose, the leaves are ordinarily rather broadly elliptic to oblanceolate and typically entire (though rarely lobed), the involucre is glabrous, the bracts purplish throughout or with a broad median purple stripe. The plant is named to honor the memory of the late Dr. Arthur Cronquist, student of the genus and friend of plant taxonomy and taxonomists, who circumscribed the taxon in notes at BRY and in a manuscript for the impending treatment in the Intermountain Flora. He did not propose a formal name for the plant. Spruce-fir and alpine tundra communities at 3050 to 3660 m in the La Sal, Tushar, and Uinta mountains and on the Aquarius and Wasatch plateaus in Beaver, Daggett, Duchesne, Garfield, Piute (type from 9 mi. W of Marysvale), San Juan, Sanpete, Summit, and Uintah counties; endemic.

**Ambrosia sandersonii** Welsh, *sp. nov.* A *Ambrosia eriocentra* (Gray) Payne in foliis tenuis et bracteis glandularis nec pilosis longis differt (Plate 1: Figure 2).

TYPE: USA. **Utah.** Washington County, T43S, R19W, S16, Beaver Dam Well road, ca. .4 km up the wash, 4 April 1993, *S. Sanderson 93-02* (HOLOTYPE BRY!; ISOTYPES NY, GH, MO, US, POM, CAS, RM, UT, UTC).

ADDITIONAL SPECIMENS: **Utah.** Washington County, Beaver Dam Wash, Beaver Dam Well road, ca. .4 km up the wash, 4 April 1993, *S. Sanderson 93-01, 93-03, 03-04*; 14 April 1993, *S. Sanderson 93-05* (all BRY!).

Shrubs, mainly 5–8 dm tall; branchlets green, becoming straw-colored to ashy in age; herbage yellow green, puberulent; leaves 2–6 cm long, the main axis linear, 1.5–3 mm wide, pinnatifid with 1–5 acicular, irregularly spaced lateral lobes, or entire, white-tomentulose on both sides; staminate heads 2.5–4 mm high, 4.6–7.3 mm wide (when pressed), the bracts obtuse, ciliate, the margins not glandular; pistillate heads 7.3–8.8 mm high, all bracts chartaceous, glandular, the margins ciliate, with a midrib, spinulose apically. Blackbrush, creosote bush, and Joshua tree communities at ca. 825 m in Beaver Dam Wash, Washington County; endemic; 5 (0).

This plant simulates *Hymenoclea salsola* T. & G. in general appearance. Its slender leaves and habit of growth are very similar to that plant. Its herbage is puberulent as in *Ambrosia eriocentra* (Gray) Payne, however, not glabrous-glandular as in *Hymenoclea*, and the fruiting bracts are typical for an *Ambrosia*. The species is known from a few dozen individuals, which appears to be sustained by recruitment from viable seeds, not what would be expected if the plants were sterile hybrids. Indeed, the mature fruiting bracts appear to surround viable seed. The species is named after the collector, an excellent botanist and researcher who first recognized its affinities.

***Artemisia campestris* L. ssp. *borealis* (Pallas) H. & C. var. *petiolata* Welsh, var. *nov.*** Plantis similis generaliter *Artemisia campestris* L. var. *scouleriana* (Benth.) Cronq. sed differente in petiolis caulis foliis brevioribus et foliis basalibus majoribus (Plate 1: Figure 3).

TYPE: USA. **Utah.** Duchesne County. T2N, R5W, S17, NW¼ USM, Ashley National Forest, Uinta Mts., trail between Little Meadow and Moon Lake, 2715 m elev., in ponderosa pine-lodgepole pine-manzanita community, 25 July 1984, *S. Goodrich 21096* (HOLOTYPE BRY!; 10 isotypes distributed previously as *Artemisia campestris* L.).

This variety differs from var. *scouleriana* by its long petioles, leaves with long, linear lateral lobes, and grayish pubescence. The

basal tuft of leaves is also much longer than for most Utah *A. campestris*.

**Erigeron sionis** Cronq. var. **trilobatus** (Maguire) Welsh, *comb. nov.* [based on: *Erigeron flagellaris* var. *trilobatus* Maguire ex Cronq., *Brittonia* 6: 258. 1947; *E. proselyticus* Nesom].

This combination is made necessary by recognition of the close affinity of the material from near Cedar Breaks, Iron County, with that of Zion Canyon.

**Haplopappus lignumviridis** Welsh, *sp. nov.* *Haplopappo crispi* L. Anderson Similis sed foliis non crispibus et capitulis parvioribus differt (Plate I: Figure 4).

TYPE: USA. Utah. Sevier County. T24S, R2W, S29 SW $\frac{1}{4}$ , SW $\frac{1}{4}$ , Cottonwood Creek riparian area, ca. 3 km S of Anabella, Utah, on moist tertiary igneous flows, with *Salix*, *Urtica gracilis*, and *Conyza canadensis*, 16 August 1983, L. Greenwood 5566 (HOLOTYPE BRY!).

Shrubs ca. 3 dm tall or more, the branchlets smooth, resin-coated; leaves .7–2.8 cm long, 1.5–3 mm wide, entire, green, narrowly spatulate, acuminate, the apex spinulose, the margins smooth, resin-coated, not especially crowded below the inflorescence; heads 3–8 per branch, rather closely aggregated and cymose; involucre obconic, the heads 12–15 mm long, 4–8 mm wide when pressed; bracts in several series, resin-coated, none green or leaflike; rays ca. 5–8, 3–4 mm long; disk flowers ca. 8–12, pale yellow; pappus tawny; achenes ca. 5 mm long, rather densely hairy. Riparian area with willow, nettle, conyza, and other bottomland plants at ca. 1890 m in Sevier County; endemic; 1 (0).

This plant does not appear to be closely allied to any of the other shrubby species of *Haplopappus* in Utah.

**Hymenoxys acaulis** (Pursh) Parker var. **nana** Welsh, *var. nov.* Similis *Hymenoxys acaulis* var. *arizonica* (Greene) Parker. sed in habitu compactiore foliis brevioribus et scapis brevioribus differt (Plate I: Figure 5).

TYPE: USA. Utah. Emery County, T26S, R9E, S2, SW $\frac{1}{4}$ , ca. 3 mi. E of the Muddy River, San Rafael Reef; 1678 m elev., Morrison Formation, juniper-single leaf ash community, 6 May 1982, D. Atwood & S. Goodrich 8652 (HOLOTYPE BRY; two isotypes distributed previously as *H. depressa*).

ADDITIONAL SPECIMENS: **Utah.** Emery County, T19S, R12E, S18, San Rafael Swell, Cedar Mountain summit, 2333 m elev., pinyon-juniper-ponderosa pine community, on Buckhorn Conglomerate, 18 May 1979, *J. Harris 126*; Red Canyon, east fork, ca. 8 km east of Buckhorn Wash, along San Rafael River, 5 June 1970, *S. L. Welsh & N. D. Atwood 9907*; Secret Mesa, San Rafael Swell, T22S, R9E, S25, ca. 1 mi. N of I-70, Navajo Sst, pinyon-juniper community, at 2100 m elev.; 24 May 1989, *S. L. Welsh & R. Kass 24303* (all BRY).

This taxon was previously included within *H. depressa*, which is a synonym of *H. torreyana*. Cronquist (personal communication) reviewed the material for the Intermountain Flora, and expanded the concept of the variety to include pulvinate caespitose phases herein regarded as portions of var. *lanata*. The dwarf plants regarded var. *nana*, seem to represent more than mere ecologically controlled variations; they apparently represent genetically controlled segregates in eastern Utah. Dwarf forms of *H. acaulis*, especially of the var. *lanata*, which have been mistaken for this entity, are more hairy and have usually broader leaves.

***Lygodesmia grandiflora* (Nutt.) T. & G. var. *doloresensis* (Tomb) Welsh, *comb. nov.* [based on: *Lygodesmia doloresensis* Tomb, *Syst. Bot. Monogr.* 1: 48. 1980].**

This and the next bring into the fold of an expanded *L. grandiflora* all of the intergrading parts. All appear to have a common origin, with each of the constituent entities reflecting overlapping morphological characters that blend where geographical ranges overlap, which is considerable for most of the taxa.

***Lygodesmia grandiflora* (Nutt.) T. & G. var. *entrada* (Welsh & Goodrich) Welsh, *comb. nov.* [based on: *Lygodesmia entrada* Welsh & Goodrich, *Great Basin Nat.* 40: 83. 1980].**

***Senecio castoreus* Welsh, *sp. nov.* Persimilis *Senecio werneriiifolio* (Gray) Gray sed in capitulus eradiatis, foliis brevioribus, involucris majoribus differt (Plate I: Figure 6).**

TYPE: USA. **Utah.** Beaver County. Tushar Mts., Mt. Belknap, T27S, R5W, S34, elev. 3538 m, in sparsely vegetated alpine tundra community, on a south-facing scree slope, 20 September 1987, *A. Teye 3680* (HOLOTYPE BRY; three isotypes distributed previously as *S. canus*).

ADDITIONAL SPECIMENS: **Utah.** Piute County, ca. 11 mi. W of Marysvale, Gold Mt., Tushar Mts., Fish Lake National Forest, T27S, R5W, S35, 18 July 1981, *N. D. Atwood 8025*; T27S, R5W, S26, Tushar Mts., Gold Mt., 14 August 1984, *A.*



*Tayle, N. D. Atwood, & S. Goodrich 3092*; Tushar Mts., ridge crest ca. 1 km ESE of Mt. Belknap summit, T27S, R5W, S35, 20 September 1987, *A. Taye 3667*; T27S, R5W, S34, SW $\frac{1}{4}$ , SW ridge of Mt. Belknap, ca. 10 mi. WSW of Marysvale, 21 July 1984, *J. S. Tuhy & K. Johnson 1704*; Tushar Mts., ridge crest ca. .5 km SE of Mt. Belknap summit, T27S, R5W, S34, 20 September 1987, *A. Taye 3674*; T27S, R5W, S26, N $\frac{1}{2}$ , Gold Mt., Tushar Mts., 28 August 1991, *R. Kass 3320* (all BRY).

Perennial herbs, typically with a subterranean caudex, sometimes somewhat soboliferous; plants 7–16 cm tall, erect or ascending; herbage more or less woolly-tomentose; basal leaves petiolate, the blades 1–1.5 cm long, 5–10 mm wide, oval to oblanceolate or oblong, entire or denticulate apically, obtuse to rounded apically; main lower cauline leaves the largest, with oval to obovate or oblanceolate blades 1.2–3.2 mm long, these entire, somewhat toothed or rarely pinnatifid, the upper ones often clasping, finally bracteate; heads mainly 1–5, subumbellately corymbose; involucre 6–9 mm long, 7–13 mm wide when pressed; main bracts 13–10, lance-attenuate, suffused with purple throughout or only at the tips or bases, typically somewhat tomentose; outer bracts very short; rays lacking; achenes glabrous. Polemonium, trisetum, festuca, and arenaria communities, often on windswept ridges or less commonly downward to the spruce-fir community, in thermally modified Tertiary igneous outcrops and gravels, at 3355 to 3875 m in Beaver and Piute counties; endemic.

Besides differing from *S. canus* in lacking ray flowers, this plant has involucre that average larger, and has shorter basal leaves. It is a true alpine dwarf, growing at very high elevations in the Tushar Mountains, which are known locally as the Beaver Mountains.

***Senecio musiniensis* Welsh, sp. nov.** Similente *Senecio fendleri* Gray sed in involucri majoribus staturis parvioribus et sobolibus consistens differt, sed affini plus arcte ad *S. canus* Hook. et *S. multilobatus* T. & G, e qua in sobolibus nullus et corollis radiis prominentibus id differt (Plate I: Figure 7).

TYPE: USA. Utah. Sanpete County. Ferron Mountain, above Ferron Reservoir, T19 $\frac{1}{2}$ S, R5E, S31, NW $\frac{1}{4}$ , on steep south-facing slope, on white Flagstaff Limestone, at 3218 m elev., 1 August 1988, *N. D. Atwood & J. Tuhy 13438*; (HOLOTYPE BRY; 7 isotypes distributed previously as *Senecio canus*).

ADDITIONAL SPECIMENS: Utah. Sanpete County, Camal Rock area, head of Twelve-

mile Creek, broken limestone area, Flagstaff, 23 July 1976, *M. E. Lewis* 4274; Ridge to Musinea Peak, 18 July 1978, *M. E. Lewis* 5516 (both BRY).

Perennial soboliferous herbs, with stems of the season arising from sobol apices; plants mainly 5–10 cm tall, erect or ascending; herbage appearing gray due to a dense floccose-tomentose; basal leaves petiolate, the blades 1–2.5 cm long, 4–10 mm wide, pinnatifid or pinnately lobed; largest cauline leaves above the base, only somewhat reduced upward, becoming sessile and finally bracteate; heads 3 to many, corymbose; involucre 8–9 mm high, 4–8 mm wide when pressed; main bracts 8–12, oblanceolate to oblong, rather abruptly acute, yellow-green to purple or with a purplish midstripe and apex, the margins scarious or hyaline, sparingly tomentose to glabrous; outer bracts very short; ray flowers lacking, or occasionally 1 per head, when present yellow and ca. 6 mm long; pappus white; achenes glabrous;  $n = 23$ . Ridge tops on Flagstaff Limestone barrens and talus slopes at Musinea Peak and on margins of the Wasatch Plateau, at ca. 2960 to 3295 m in Sanpete County; endemic.

This taxon appears to be allied to *S. canus* (source of gray tomentum) and *S. multilobatus* (source of the pinnatifid leaves); it differs from both in the presence of sobols and in the eradiate or only sparingly radiate heads.

#### CRUCIFERAE

***Lepidium montanum* var. *claronensis* Welsh, var. nov.** A *Lepidium montano* Nutt. var. *montano* in habitus perenni et inflorescentia frondoso caule longiore differt (Plate I: Figure 8).

TYPE: USA. Utah. Garfield County, T35S, R4½W, SW/NW S10, Casto Canyon, Dixie National Forest, in scattered ponderosa pine with Apache plume, on SW exposure, at ca. 2196 m, 14 June 1990, *N. D. Atwood, B. Franklin, & B. Reynolds* 13744 (HOLOTYPE BRY!).

ADDITIONAL SPECIMENS: Utah. Garfield County, T31S, R2W, S26, ca. 5 km S of Antimony, along the Sevier River, at ca. 2013 m, 4 June 1984, *L. C. Higgins et al.* 14271; T31S, R1W, S6, near mouth of Dry Wash, 20 Sept. 1992, *K. T. Anderson* 552. Kane County; ca. 6 km E of Hwy 89 on road to Alton, T39S, R6W, in ponderosa community, 25 June 1983, *N. D. Atwood* 9471. Piute County; Dry Fork Canyon, ca. 8 km NE of Antimony, T30S, R1W, S32, 28 July 1976, *S. L. Welsh et al.* 14124 (all BRY!).

This is a dwarf perennial with marcescent leaf bases on the caudex branches. It shares its perennial habit with both var. *nee-*

*seae* Welsh & Reveal and var. *stellae* Welsh and Reveal; from the former the plants differ in having pinnatifid basal and cauline leaves and from the latter in having glabrous pods. The plant occurs in montane habitats and has about the same morphological and geographic integrity as do other varieties in the species.

#### HYDROPHYLLACEAE

**Phacelia cronquistiana** Welsh, *sp. nov.* Persimilis *Phacelia incana* Brand sed in calyce ad anthesis brevior planta parvior, pilis glandulosis brevioribus et seminibus parvioribus differt (Plate I: Figure 9).

**TYPE:** USA. **Utah.** Kane County: T40S, R4½W, head of Johnson Canyon, 4.5 km E of junction on road to Cannonville, at 1920 m, on clay outcrops in pinyon-juniper-sage community, 13 June 1983, *N. D. Atwood 9458* (HOLOTYPE BRY!; isotypes, none distributed previously as *Phacelia incana*).

**ADDITIONAL SPECIMENS:** **Utah.** Kane County, 4.5 km E of Skutumpah-Alton Junction, at head of Johnson Canyon, T40S, R4½W, 7 June 1969, *N. D. Atwood 1800, 1803*; 4.5 km E of Hwy 89, on road to Alton, T32S, R6W, ponderosa pine community at ca. 2100 m, 25 June 1983, *N. D. Atwood 9472* (all BRY!).

Annual, 6–9 (10) cm tall; stems erect, shortly capitate-glandular, simple or branching from the base; leaves essentially all cauline, petiolate, the blades 3–7 mm long, 2–6 mm wide, oval to rhombic, often broader than long, entire or less commonly some crenate; cymes terminal on main stems and branches, 2–6 cm long in fruit; pedicels ca. .5 mm long at anthesis, becoming up to 4 mm long in fruit; sepals linear-oblong to spatulate, 2–2.8 (3.2) mm long at anthesis, to 6; .2 mm long in fruit, .5–1.2 mm wide; corolla tubular-campanulate, 3.5–4 mm long, pale purple with a white tube; anthers included; style bilobed; seeds ca. 25–35, ca. .3–.4 mm long, pitted. Pinyon-juniper-sagebrush and ponderosa pine communities at 1920 to 2100 m in western Kane County; endemic.

This taxon is dedicated to the late Dr. Arthur Cronquist, who first noted it as distinctive. The plant was initially collected by N. D. Atwood in 1969 and identified as *P. rotundifolia* Torr. ex Wats., and later as both *P. pulchella* Gray and *P. lemmonii* Gray. It is most similar to *P. incana*, however, differing in its shorter flowering calyx, smaller size of all parts, shorter glandular pubescence, and smaller seeds. Similar, and perhaps identical material was collected in 1993 by N. D. Atwood from near Mt. Trumbull in Arizona.

**Phacelia pulchella** Gray var. **atwoodii** Welsh, *var. nov.* Similis *Phacelia pulchella* Gray var. *pulchella* in floribus coloris et magnitudine sed in foliis crenatis consistantibus differt et var. *sabulonum* in foliis crenatis sed in corollis magnitudine et foliis tenuissimis texturis differt (Plate I: Figure 10).

**TYPE:** USA. **Utah.** Kane County: T43S, R4W, S33, S of Hwy 89, ca. 10 km E of Johnson Canyon, Moenkopi Formation, juniper-sagebrush community, 24 April 1992, *S. L. Welsh & K. H. Thorne 24900* (HOLOTYPE BRY; 9 isotypes to be distributed).

**ADDITIONAL SPECIMENS:** **Utah.** Kane County: T44S, R5S, S1, 10 May 1992, *K. Thorne & C. Zupan 10125*; T43S, R2W, S30, Cockscomb, south road, Carmel Formation, 8 May 1992, *K. Thorne & C. Zupan 10073*; T43S, R4W, S33, S of Hwy 89, ca. 10 km E of Johnson Canyon, 29 May 1992, *S. L. Welsh 25037*; ca. 32 km E of Hwy 89, along Alton Road, T40S, R5W, 25 June 1989, *N. D. Atwood 9470*.

Pinyon-juniper, oak, sagebrush, single-leaf ash, and service-berry communities at ca. 1550 to 1680 m in western Kane County; endemic. This is the pretty annual phacelia that grows with other plants in the duff that accumulates in the shelter of juniper trees and other desert shrubs in western Kane County.

#### LEGUMINOSAE

**Astragalus toanus** Jones var. **scidulus** Welsh & Atwood, *var. nov.*  
A *Astragalo toano* Jones in floribus minoribus et pallidioribus et leguminibus latioribus differt (Plate I: Figure 11).

**TYPE:** USA. **Arizona.** Mohave County: T37N, R10W, S33, Mohave Strip, E flank of Diamond Butte, with mixed juniper-eriogonum-hilaria community, on Moenkopi Formation, at ca. 1600 m elev., 16 April 1989, *N. D. Atwood & S. L. Welsh 13526* (HOLOTYPE BRY!; ISOTYPES NY, GH, MO, US, POM).

**ADDITIONAL SPECIMENS:** **Arizona.** Mohave County: T37N, R10W, S33, Mohave Strip, E. flank of Diamond Butte, 20 May 1987, *N. D. Atwood & K. H. Thorne 12691* (BRY!).

This phase of *A. toanus* is disjunct from the main distribution of the species by more than 150 km, and while it differs only in degree from the species, it is most certainly isolated, reducing the possibility of genetic exchange to essentially zero. The flowers average smaller than for the species as a whole, are pale throughout, a greenish yellow or dull whitish, but with pure white wing-tips as in the species. The pods are broader than for the bulk of the *A. toanus* specimens examined, being approached in width by only a few specimens.

**Astragalus zionis** Jones var. **vigulus** Welsh, *var. nov.* Similis *Astragalo zionis* var. *zionis* sed in leguminibus longioribus et latioribus differt (Plate I: Figure 12).

TYPE: USA. **Utah.** Washington County. T39S, R13W, S20, along side the Browse road to Guard station, E side of the Pine Valley Mts., at 2000 m elev., sandy soil, in pinyon-juniper-mountain brush community, 7 June 1983, *L. C. Higgins 13577* (HOLOTYPE BRY!; four isotypes distributed previously as *A. tephrodes* Gray).

ADDITIONAL SPECIMENS: **Utah.** Washington County, T39S, R14W, S28, Pine Valley Mountains north slope, 2500 m elev., 23 June 1983, *L. C. Higgins 13769*; T39S, R13W, S30, ca. 5.5 mi N of I-15 on Browse turnoff to Harmon Creek, 8 June 1981, *N. D. Atwood 7893*; T39S, R13W, E slope of Pine Valley Mts., between Browse guard station & Syler Spring, 16 May 1984, *N. D. Atwood 9556*; T39S, R13W, S30, ca. 7 mi. W of Browse Interchange, oak-Garrya community, 22 April 1982, *S. L. Welsh & N. D. Atwood 21056*; T39S, R13W, S30, Jct Blake-Harmony trail and Browse road, 19 May 1986, *R. B. & D. R. Warrick 1421* (all BRY!).

Specimens of this taxon have very coarse, large pods and grow in huge mats or clumps to a meter wide or more. It was mistaken previously as a phase of *A. tephrodes* Gray, which is still unknown in the state. It grows in pinyon-juniper and mountain brush communities on the east and north flanks of the Pine Valley Mountains in Utah.

**Pediomelum aromaticum** (Payson) W. A. Weber var. **barnebyi** Welsh, *var. nov.* Persimilis *Pediomelo aromatico* (Payson) W. A. Weber var. *aromatico* sed in inflorescentiis infimis per multifloris (10-12 nec 3-7) et pedunculis longioribus (.7-1.3 nec .1-.5 cm) differt (Plate I: Figure 13).

TYPE: USA. **Utah.** Washington County, Hildale, T43S, R10W, S26, ca. 1350 m elev., in pinyon-juniper forest, Chinle Formation, 3 June 1993, *S. L. Welsh & K. H. Thorne 25586* (HOLOTYPE BRY!; ISOTYPES, NY, GH, MO, US, POM, CAS, RM, UT, UTC, and others).

ADDITIONAL SPECIMENS: **Arizona.** Mohave County, on red sandstone with pinyon-juniper and *Shepherdia rotundifolia*, 1560 m in the canyon N of Colorado City. Widely rhizomatous (no tuber); banner purplish fading whitish; wings purple-tipped, 10 May 1986, *R. C. Barneby 18129* (BRY!; NY?). Ca. 8 km north of Moccasin, on Coral Pink sand dunes road, on Chinle Formation, 19 May 1972, *N. D. Atwood & L. C. Higgins 3935* (BRY!). **Utah.** Washington County, near base of Canaan Mountain, north of Colorado City, elev. 1373-1525 m. Navajo sandstone formation, 14 May 1991, *L. M. Shultz/J. Anderson 5385* (NY; UTC?).

Pinyon-juniper and silver buffaloberry community at ca. 1560 m on Navajo Sandstone adjacent to Short Creek, north of Colorado City, Mohave County, Arizona and immediately contig-

uous Hildale, Washington County, Utah, and eastward evidently on the Chinle Formation north of Moccasin.

The locally abundant, widely rhizomatous and hence colonial, plants grow in patches at the southern base of Canaan Mountain near Short Creek and eastward below of the Pink Cliffs to the vicinity of Moccasin, in at least two slightly disjunct populations far removed from the nearest populations of the species, which otherwise is known only from eastern Utah and adjacent Colorado. Their morphological discontinuities are in the order of magnitude of varietal segregants in this and other genera. More specimens might demonstrate even more substantial diagnostic characters. It seems certain that there is little possibility for genetic interchange between the disparate populations.

The distribution of Barneby's *pediomelum* is almost matched by that of the totally unrelated *Cycladenia humilis* Gray, which occurs in disjunct populations on seleniferous siltstone formations, including the Chinle, from the base of the La Sal Mountains in Colorado and Utah disjunctly to Chinle Formation west of Moccasin in Mohave County, Arizona. Both the *Cycladenia* and the *Pedimelum* are to be expected at other locations on the Chinle (and possibly on the Moenkopi) where it outcrops in Mohave and Kane counties. A solitary specimen of this species (*Atwood and Higgins 3935*, cited above), in vegetative condition has long been troublesome among the herbarium specimens of this genus from the vicinity of the Arizona Strip and adjacent Kane and Washington counties, where there exists a series of species within this distinctive genus. That specimen was initially placed with the poorly understood *P. epipsilum*, but always stood out because of the attenuate (not foliose) stipules and densely white hairy, very elongate (not short, mostly obscured) internodes. The taxon was subsequently found by Shultz and Anderson, and by Dr. Barneby, in the Short Creek area about 30 km west of the initial discovery. The habitat seems to be confined mainly to the Chinle silts and muds, in spite of other formations being designated on the collection labels. The Chinle is immediately overlain by sandstones older than the Navajo, but resembling that formation. The *P. aromaticum* complex extends from the vicinity of the La Sal Mountains in both Colorado and Utah into San Juan County, and disjunctly southwestward to the vicinity of Canaan Mountain in Washington County, Utah and Mohave County, Arizona. The segregates can be distinguished by the following key.

1. Lowermost racemes, at least, (7) 8- to 12-flowered and on peduncles .7–1.3 cm long; plants of Short Creek vicinity, Washington County and adjacent Mohave County, Arizona *P. aromaticum* var. *barnebyi*
- Lowermost racemes mainly 3- to 7-flowered and on peduncles less than .5 cm long; plants of eastern Utah and adjacent Colorado 2
- 2(1). Stems prostrate-ascending; flowers mainly 7–9 mm long; plants of rimrock and shallow sand in San Juan County *P. aromaticum* var. *tuhyi*
- Stems mainly erect or ascending; flowers mostly 10–12 mm long; plants of Emery(?) and Grand counties *P. aromaticum* var. *aromaticum*

Var. *aromaticum* Pinyon-juniper and mixed desert shrub communities at ca. 1530 m in Emery (?) and Grand counties; Paradox Basin, Colorado; essentially a Navajo Basin endemic.

Var. *barnebyi* Welsh Pinyon-juniper and silver buffaloberry community at ca. 1560 m on Navajo Sandstone adjacent to Short Creek, north of Colorado City, Washington County, Utah and immediately adjacent Mohave County, Arizona east to the vicinity of Moccasin.

This plant is far removed from the nearest populations of the species, which otherwise is known only from eastern Utah and adjacent Colorado. Its differences are in the order of magnitude of varietal differences in this and other genera. More specimens might demonstrate even more substantial characters than those cited in the key.

Var. *tuhyi* Welsh Pinyon-juniper and mixed desert shrub communities on the Entrada, Kayenta, and Mossback formations, Rone Bailey Mesa (type locality, *Welsh & Neese 23500*, 1985, HOLOTYPE BRY!), Canyonlands overlook, and Six-shooter Peak vicinities, on rimrock or shallow sand, at 1700 to 1985 m in San Juan County; endemic.

This variety has been discounted by recent workers in the genus. It does, however, demonstrate more than a mere trend in variation—the plants are isolated from the main body of the species to the north and east, and the flowers are consistently smaller. Even though occasional specimens in the type variety have flowers approaching the size of those in this variety, they are generally

larger. And, the prostrate-ascending stems of var. *tuhyi* are not due to the plants growing on unstable slopes. Quite the contrary is true; the substrates are quite stable, often the plants grow with roots in crevices in bedrock.

**Trifolium friscanum** (Welsh) Welsh, *comb. nov.* [based on: *Trifolium andersonii* var. *friscanum* Welsh, Great Basin Naturalist 38: 355. 1968].

This taxon is distinguished clearly from *T. andersonii* Gray, by its 3 (not 4 or 5) leaflets, short free tips of stipules, short petioles and few-flowered racemes. Furthermore, the plant is more than 250 km distant from the nearest known locality for *T. andersonii*.

#### LOASACEAE

**Mentzelia goodrichii** Thorne & Welsh, *sp. nov.* Similis *Mentzelia multicaulis* (Osterh.) Goodman in duratione, aspectu, et caudice sed in petalis majoribus et plus numerosis (10 nec 5) et foliis majoribus insigniter divergente (Plate I: Figure 14).

TYPE: USA. Utah. Duchesne County. T11S, R12E, NE¼ S5, West Tavaputs Plateau, Badland Cliffs, breaks north of Argyle Canyon, at 2623 to 2684 m, with scattered bristlecone pine, on marl limestone, on steep south exposure, 15 July 1992, C. Goodrich 23806 (HOLOTYPE BRY!; ISOTYPES NY, GH, MO, US, POM, CAS, RM, UT, UTC, and others).

ADDITIONAL SPECIMENS: Utah. Duchesne County: T11S, R13E, S6, East Tavaputs Plateau, Badland Cliffs, escarpment at rim of Argyle Canyon, scattered limber pine, pinyon, Douglas fir, holodiscus, on Green River Formation, on 60 to 80% southern exposure, 6 July 1992, S. Goodrich 23781 (BRY!; 11 duplicates to be distributed); T6S, R8W, S4, Upper NE slope of Willow Canyon, south facing slope of white shale, 3 July 1988, M. A. Franklin & J. Chandler 6258 (BRY!; 5 duplicates distributed previously as *M. multicaulis*).

Long-lived, clump-forming perennial, of shaly slopes, from a branching woody caudex and stout taproot; stems white, puberulent, diffusely branched from near the base, flexuous, the branches initially widely spreading, becoming curved-ascending; leaves narrowly oblong to narrowly oblanceolate or lanceolate in outline, shallowly undulate-dentate with few rounded to obtuse teeth on each side; some of the upper leaves and bracts entire, linear to linear-lanceolate; ultimate branches of inflorescence 1- to



3-flowered; calyx lobes 8–13 mm long; petals 10, oblanceolate; 12–20 mm, 5–10 mm wide; outer petaloid stamens spatulate, narrower and shorter than the petals; capsule 12–13 mm long, cylindrical; seeds immature, whitish, evidently winged. Steep, white, marly calciferous shale outcrops of Green River Formation with scattered limber pine, pinyon pine, Douglas fir, mountain mahogany, and rabbitbrush, along escarpment of Willow and Argyle canyons, at 2470 to 2685 m, in Duchesne County; endemic.

This plant has the general branching pattern of *M. multicaulis*, which also has a well developed though superficial caudex. It is likewise similar to that entity in bearing mainly cauline leaves, but it differs significantly in having ten large petals, a subterranean caudex, and in the larger green leaves.

#### ONAGRACEAE

**Camissonia bairdii** Welsh, *sp. nov.* Plantis similis *Camissonia scapoidea* (Torr. & Gray) Raven sed in capsulis longioribus et glandulari-pubescentibus ubique differt (Plate I: Figure 15).

**TYPE:** USA. **Utah.** Washington County. T40S, R17W, SW $\frac{1}{4}$  S19, between Manganese Wash and Miner's Canyon, ca. 3 km E of Gunlock, pinyon-juniper community, in clay soil of Carmel Formation, 11 May 1987, *G. I. Baird & M. A. Franklin 2657* (HOLOTYPE BRY!; two isotypes distributed previously as *Camissonia*).

**ADDITIONAL SPECIMENS:** **Utah.** Washington County. Along dirt road south of Rockville and at the west base of Smithsonian Butte, 26 May 1973, *N. D. Atwood 5139*; T40S, R17W, SW S19, ca. 3 km E of Gunlock, between Manganese Wash and Miner's Wash, in blackbrush community, 11 May 1987, *M. A. (Ben) Franklin & G. Baird 4700A*; Petrified Forest, head of Huber Wash, T41S, R11W, S25, north of Rockville, 4 May 1989, *S. L. Welsh & S. L. Clark 24281* (all BRY!).

Annual herbs from taproots; stems mainly 4.5–12 cm tall, simple, with main foliage leaves near the stem base; herbage minutely glandular puberulent, and sometimes also sparingly villous with long hairs; leaves petiolate, the blades simple (or with one to few, tiny, lateral segments), .8–3 cm long, 5–13 mm wide, lance-ovate to lanceolate, subentire to undulate-crenate; flowers 2–6, in terminal, minutely bracteate, nodding, subscapose racemes; hypanthium 1–1.8 mm long; sepals 3.3–4 mm long, reflexed at anthesis; petals yellow, often red-spotted near the base, 4–5 mm long; stamens 8, dimorphic, the longer usually surpassing the shorter by ca. 1 mm; anthers 1–1.9 mm long; pedicels ascending, 3–14 mm long; capsules 33–50 mm long, 1.8–2.2 mm thick; seeds in

2 rows per locule, ca. 1 mm long, not winged. Blackbrush and pinyon-juniper communities at ca. 1190 to 1310 m in Washington County; endemic.

Specimens of this plant have been variously identified, an indication that they did not readily fit into any of the known species. They are apparently most closely allied to *C. scapoidea*, however, the long pods simulate those of *C. chamaenerioides* but are much thicker. And the rather uniform glandular puberulence coupled with geographic disjunction from *C. scapoidea* lends credence to the designation of the material as belonging to a different taxon.

**Camissonia claviformis** (Torr. & Frem.) Raven var. **cruciformis** (Kellogg) Welsh, *stat. nov.* [based on: *Oenothera cruciformis* Kellogg, Proc. Calif. Acad. Sci. 2: 227. 1873].

A solitary specimen (*Baird 1964-b* BRY!), possibly belonging to this taxon, is known from Beaver Dam Wash, Washington County, Utah. If correctly identified it is far removed from the remainder of the variety in western Nevada and southern Oregon.

#### POLEMONIACEAE

Specimens of *Gilia latifolia* Wats. were discovered in 1971 in Warm Creek Canyon, north of Lake Powell in Kane County. Since then the species has been found growing in Cataract Canyon, in the vicinity of Big Drop rapids and Imperial Canyon, in both Garfield and San Juan counties. It was also discovered in the San Rafael Swell vicinity in southern Emery and adjacent Wayne counties. These eastern materials have somewhat smaller floral and fruiting parts, more confluent leaves, and more intricately branched inflorescences than do those from the body of the species to the west. They are geographically isolated from plants of the type variety far to the west, and are distinguished as follows:

**Gilia latifolia** Wats. var. **imperialis** Welsh, *var. nov.* Similis var. *latifolia* in foliis latioribus et habitis generalis, sed in calycis, calycis dentibus, et capsulis minoribus, foliis plus confluentibus, et plantis majoribus differt (Plate I: Figure 16).

TYPE: USA. Utah. San Juan County, T31S, R17E, S33, Cataract Canyon, ca. .8 km N of Imperial Canyon, at ca. 1129 m, in mixed desert shrub community on Hermosa Formation, 15 Sept. 1983, S. L. Welsh 22507 (HOLOTYPE BRY!; four isotypes previously distributed as *Gilia latifolia* Wats.).

ADDITIONAL SPECIMENS: **Utah.** Emery County, T26S, R9E, S32, San Rafael Swell, Maroni Slopes, 5 June 1980, *J. G. Harris 874* (BRY!). Garfield County, T31S, R17E, S15, Big Drop, Cataract Canyon, 5 May 1983, *S. L. Welsh 21819* (BRY!). Kane County, Warm Creek Canyon, 1.5 km S of access road, in sandy wash bottoms, 18 June 1971, *N. D. Atwood/R. Allen 2901* (BRY!); Tibbet Canyon, ca. 24 km NE of Glen Canyon City, Straight Cliffs Formation, 4 September 1973, *N. D. Atwood 5959* (BRY!). San Juan County, T31S, R17E, S17, Big Drop Two rapids, Colorado River, Cataract Canyon, 14 October 1983, *S. L. Welsh 22649* (BRY!); T31S, R17E, S33, Cataract Canyon, Imperial Canyon, 20 September 1983, *S. L. Welsh & E. Neese 22534* (BRY!); T31S, R17E, S21, Big Drop Three, 8 August 1983, *L. C. Higgins et al. s.n.* (BRY).

This *gilia* can be distinguished from the typical western material by the following key:

1. Calyx 2.8–4.8 mm long, the teeth 1–2 mm long; capsules 3–4.5 (4.9) mm long; plants often over 2.5 dm tall, known from Emery, Garfield, Kane, and San Juan counties *G. latifolia* var. *imperialis*
- Calyx (4.4) 5–6.9 mm long, the teeth 2–3.6 mm long; capsules (4.5) 5.2–7 mm long; plants mainly less than 2.5 dm tall, known from Washington County *G. latifolia* var. *latifolia*

**Var. *imperialis*** Welsh Shadscale and other mixed desert shrub communities at 1160 to 1590 m in Emery (Moroni Slopes, San Rafael Swell), Garfield, Kane, San Juan, and Wayne counties (where they abut on Cataract Canyon); endemic. The plants are locally common in Cataract Canyon, where they occur among boulders above high water level in a salt-desert shrub community. Its disjunct distribution is a near match for that of *Opuntia basilaris* Engelm. & Bigel var. *heilii* Welsh & Neese.

**Var. *latifolia*** Creosote bush and blackbrush communities at ca. 825 m in Washington (type from near St. George) County; California, Arizona, and Nevada. The type of the species was collected by C. C. Parry in 1874 near St. George, but the species has been taken again in Utah only rarely. It is locally common in desert tracts in southern Nevada and California.

#### POLYGONACEAE

***Eriogonum corymbosum*** Benth. var. ***albiflorum*** (Reveal) Welsh, *comb. nov.* [based on: *Eriogonum thompsonae* Wats. var. *albiflorum* Reveal, Madrono 19: 299. 1968].

The alliance of *E. thompsonae* sens. lat. with *E. corymbosum* appears to be inevitable, due to mixing of characters, especially in Washington County, where the types of var. *aureum* typically assigned to *E. corymbosum* and varieties *matthewsiae* and *albiflorum* were taken. The combination of *thompsonae* with *corymbosum* allows for solution of the problem of what to do with the many intermediates, which indicate a close relationship of the two complexes. Hence, the need for formal proposal of the combinations contained herein.

The transitionally narrow-leaved counterpart of var. *albiflorum* in Mohave County, Arizona, is recognized as *E. corymbosum* Benth. var. **atwoodii** (Reveal) Welsh, *comb. nov.* [based on: *Eriogonum thompsonae* Wats. var. *atwoodii* Reveal, Great Basin Nat. 34: 245. 1974].

**Eriogonum corymbosum** Benth. var. **thompsonae** (Wats.) Welsh, *comb. nov.* [based on: *Eriogonum thompsonae* Wats., Amer. Nat. 7: 302. 1873].

This taxon, with its subcaulescent habit, smooth yellow green leaves, and bright yellow flowers is an attractive plant on the Chinle muds and silts from the vicinity of Kanab westward to Colorado City. It is transitional in every way with both varieties *albiflorum* and *atwoodii*. Additionally it passes through var. *albiflorum* to the *E. corymbosum* varieties *matthewsiae* Reveal and *aureum* Jones.

**Eriogonum jamesii** Benth. var. **higginsii** Welsh, *var. nov.* Similis *Eriogono jamesii* Benth. var. *flavescens* in coloris florum et habitu, sed in monoinvolucris differt (Plate I: Figure 17).

TYPE: USA. **Utah.** San Juan County, T34S, R25E, S3, ca. 0.5 mi. W of junction to Eastland on Hwy 666, sagebrush community, in sandy soil, 19 June 1985, L. & E. Higgins 15823 (HOLOTYPE BRY!; 8 isotypes distributed previously as *E. jamesii* var. *flavescens* Wats.

ADDITIONAL SPECIMENS: **Utah.** San Juan County, Junction of Hwy 160 and the road to Eastland; sandy soil; pinyon-juniper-artemisia community, 3 July 1970, L. C. Higgins 3567 (BRY!); along Hwy 160, 11.3 mi. E of Monticello on low flats and rolling hills, associated with sagebrush, in large mats to 6 dm across, 28 June 1971, J. L. Reveal 2502 (BRY!).

The plants from San Juan County are far removed geographically from the remainder of the species in Utah. The specimens

examined, all from about the same locality, have uniformly monoinvolucrate inflorescences, a condition that occurs occasionally within the distribution of the allied var. *flavescens*. However, that condition is seldom correlated on a population basis, and although admittedly a weakly disposed taxonomic character, the plants are readily identifiable.

**Eriogonum racemosum** Nutt. var. **nobilis** Welsh & Atwood, *var. nov.* Similis var. *zione* in caulibus leviter fistulosis et var. *racemoso* in habitu generali sed e ambo in floribus pallidis flavescentibus differt (Plate I: Figure 18).

TYPE: USA. **Utah**. San Juan County, T40S, R21E, S33, along the San Juan River, ca. 3 mi. W of Bluff, sandy soil, in atriplex/populus comm., at ca. 1300 m elev., 10 Sept. 1991, *N. D. & J. Atwood 17250* (HOLOTYPE BRY; ISOTYPES NY, US, MO).

This is a tall, slender phase of the species with numerous involucre in the inflorescence and cream to yellowish flowers. It is disjunct from the similar var. *zionis* by more than 150 km.

#### RANUNCULACEAE

**Aquilegia grahamii** Welsh & Goodrich, *sp. nov.* A *Aquilegia micrantha* Eastw. in floribus rubro-purpureis et luteis, a *A. formosa* Fisch. ex DC. in glandiferis omnino et var. *fosteri* in petalis brevioribus et floribus longioribus, et a *A. flavescens* var. *rubicundula* (Tidestr.) Welsh in floribus atrorubropurpureis et longioribus quam latioribus differt (Plate I: Figure 19).

TYPE: USA. **Utah**. Uintah County, T2S, R22E, SW $\frac{1}{4}$  S7, Hole In The Wall Canyon, 10 mi. 14°N of Vernal, Uinta Mountains, Ashley National Forest, sandy soil along drip line below weeping, hanging garden cliffs of Weber Sandstone, growing with *Calamagrostis scopulorum*, at ca. 2320 m, 21 June 1993, *A. Huber & C. Plunkett 91* (HOLOTYPE BRY!; ISOTYPES NY, GH, MO, US, POM, CAS, RM, UT, UTC, and others).

ADDITIONAL SPECIMENS: **Utah**. Uintah County, Crack of rock cliff, Brush Creek Gorge, at ca. 1980 m, 11 August 1935, *E. H. Graham 10009* (CM).

Plants 2.5–6 dm tall; stems copiously to rather sparingly glandular and with adhering sand grains here and there throughout; leaves mainly basal, 4–24 cm long, biternate, rather copiously villous-glandular, green on both sides but paler beneath; flowers

usually 2–6 or more, nodding, somewhat longer than broad; sepals horizontally spreading, 11–14 mm long, red-fuchsia; petals with spurs colored like the sepals, the blades clear yellow, 5–6 mm long; spurs 18–21 mm long; stamens exceeding the blades by 9–13 mm; follicles unknown. Sandy soil along drip line below weeping, hanging garden cliffs of Weber sandstone, with *Calamagrostis scopulorum*, at ca. 2320 m, in deep, shaded canyons in the eastern Uinta Mts., Uintah County; endemic.

This is another in a series of variants within the genus *Aquilegia* in Utah. Early treatments of the genus recognized only *A. micrantha* as being glandular overall, and all specimens encountered that were so clad were placed within that entity. Such placement ignores other features of flowers, overall nature of the plants, and phytogeography. The attempt in recent years has been to place the glandular plants with apparent nearest congeners. The present instance recognizes the similarities and differences of this plant, with its syndrome of features unmatched by the other taxa. This plant simulates *A. micrantha* in being glandular throughout, but the flowers are startlingly red-fuchsia contrasting with yellow, not white to pale blue or pinkish. Additionally they are longer than broad. From *A. formosa*, which has similar though more scarlet than red-fuchsia flowers, it differs in being glandular overall and in having flowers longer than broad. It differs from the glandular, var. *fosteri*, of that species in having shorter sepals, shorter petals, and shorter spurs, and from *A. flavescens* var. *rubucundula* in the darker flowers, larger size of the plant, and flowers longer than broad. The species was first discovered in 1935 by E. H. Graham (1937) when he was involved with his classic investigation of the botany of the Uinta Basin. The species is named in honor of his amazing contribution.

#### RHAMNACEAE

***Ceanothus greggi* Gray var. *franklinii* Welsh, var. nov.** Affinis var. *vestito* (Greene) McMinn sed in staturis inferioribus et petalis plerumque cyaneis differt (Plate I: Figure 20).

TYPE: USA. Utah. San Juan County, T41S, R17E, S12, Muley Point, at 1891 m, rimrock, pinyon-juniper community, Cedar Mesa Sandstone, 8 June 1983, S. L., B. T., and M. L. Welsh 22244 (HOLOTYPE BRY!; three isotypes distributed previously as *C. greggii*).

ADDITIONAL SPECIMENS: Utah. Grand County, ca. 7 mi. E of Moab, N slope of

Mill Creek, 26 April 1986, *B. Franklin* 2857; small mesa between Onion Creek and Fischer Mesa, 17 May 1985, *B. Franklin* 1593. San Juan County: Young's Canyon, tributary to Dark Canyon, ca. 2 mi. upstream from canyon mouth, 27 August 1977, *B. Mikus* 610; SE end of Spanish Valley, 26 April 1986, *B. Franklin* 2842 (all BRY!).

This low ceanothus is often a rimrock plant in pinyon-juniper and associated shrublands in Grand and San Juan counties. It seldom surpasses 5 dm in height and typically has flowers that are blue or fade that color. The plants are isolated geographically from the remainder of the species in Utah. The following key will allow segregation of the Utah materials.

1. Shrubs 2–5 dm tall, intricately branched; flowers typically blue or fading blue; plants of the Colorado drainage system *C. greggii* var. *franklinii*
- Shrubs mainly 10–20 dm tall, not especially intricately branched; flowers typically white and drying white; plants of the Virgin drainage system and environs *C. greggii* var. *greggii*

Var. **franklinii** Welsh Pinyon-juniper, blackbrush, shunkbush, and serviceberry communities at 1645 to 1895 m in Grand and San Juan counties (type from Muley Point, *S. L.*, *B. T.*, and *M. L. Welsh* 22244, BRY!); endemic.

The plants occur as scattered shrubs over a wide area in Grand and San Juan counties. There is a specimen at BRY! (*Nixon* 16274, 1985) with label data indicating that it was taken in Garfield County northwest of Escalante at North Creek Reservoirs between Barker Reservoir and Flat Lake in an aspen-spruce-fir community. The locality should be revisited and the collection verified.

Var. **vestitus** (Greene) McMinn [*C. vestitus* Greene]. Mixed desert shrub, pinyon-juniper, and mountain brush communities at 1220 to 2870 m in Iron and Washington counties; Nevada, California, Arizona, New Mexico; Texas, and Mexico.

Plants from Washington County are typically much taller (1–2 m). The species is grown as a specimen plant on the campus of the University of Utah in Salt Lake City (*Labrum* 4, 1970 BRY!).

#### SCROPHULARIACEAE

**Penstemon franklinii** Welsh, *sp. nov.* A *Penstemon pinorum* L. & J. Shultz in habitu compacto, foliis caulini latioribus, inter-

nodiis brevioribus, floribus majoribus et antheris longioribus differt (Plate I: Figure 21).

TYPE: USA. Utah. Iron County, T34S, R11W, NW/SE S8, ca. 10 km due NW of Enoch, N end Cedar Valley, three-awn, needle grass, matchweed, black sagebrush community at 1655 m, 27 May 1993, *M. A. Franklin & L. Armstrong* 7662 (HOLOTYPE BRY!; ISOTYPES NY, GH, MO, US, POM, CAS, RM, UT, UTC).

ADDITIONAL SPECIMENS: Utah. Iron County, ca. 15 km WNW of Summit, N end Cedar Valley, 26 May 1993, *M. A. Franklin & L. Armstrong* 7660; ca. 5 km W of Rush Lake, 27 May 1993, *L. Armstrong & M. A. Franklin* 429; ca. 10 km due NW of Enoch, N end of Cedar Valley, 28 May 1993, *M. A. Franklin* 429; ca. 10 km due NW of Enoch, N end of Cedar Valley, 28 May 1993, *M. A. Franklin* 7666 (all BRY!, with numerous duplicates to be exchanged).

Perennial herb from a branching caudex; stems 6–25 cm tall, compact, the lower two nodes less than one-third the plant height, puberulent almost throughout, becoming glandular-hirsute above; leaves 1.2–6.5 cm long, 2–8 mm wide, variously all entire to all toothed, the uppermost cauline and bracteate leaves commonly toothed, the basal ones long-attenuate to a petiolar base, the blades glabrous on both sides or puberulent along the middle above, the cauline leaves and bracts lance-attenuate, more or less clasping; inflorescence conspicuously glandular-hirsute, lax or congested, not secund; verticillasters 3–7, the cymes 3- to 5-flowered; calyx 4.8–7.5 mm long, glandular-hirsute to -pilose, the lobes lanceolate to elliptic, cyaneus apically; corolla 14–22 mm long, moderately ampliate, blue to blue-lavender, the palate yellow-bearded, with purple guidelines; staminode included or only slightly exerted, bearded with flattened golden yellow hairs for half its length; anthers glabrous, 1.6–1.8 mm long, the sacs parallel, dehiscing the full length and across the connective, not explanate. Three-awn, needlegrass, matchweed, and black sagebrush communities at 1650 to 1800 m in Cedar Valley, Iron County; endemic.

*Penstemon franklinii* belongs to Section *Cristati*, a group of closely allied species, many of them rather narrow endemics of desert regions extending from Colorado to Idaho, Oregon, Nevada, and California. This species has as its nearest ally, both morphologically and geographically, the pinyon penstemon, *P. pinorum*, a plant from nearby to the south in Iron County. Similar occurrences of nearly associated geographical elements are to be found in *P. concinnus* Keck, *P. nanus* Keck, and *P. dolius*, all of which occur in west desert valleys of Utah. Each of those differ



in about the same manner and degree from each other as *P. franklinii* does from *P. pinorum*. *P. pinorum* has all leaves more or less strongly and sharply toothed, the lower two internodes make up one-third to one-half of the plant height, the cauline leaves are linear and rather abruptly widening to clasping bases, the purple-blue corollas are 10–15 mm long, and the anthers 1–1.2 mm long. By contrast, *P. franklinii* has leaves variably toothed to entire, the lower two internodes are not elongated, making up less than a third of the plant height, the cauline leaves are lance-attenuate and rather gradually broadened to the clasping base, the blue corollas are 14–22 mm long, and the anthers 1.6–1.8 mm long.

The species is named after M. A. (Ben) Franklin, co-discoverer of the species and co-collector of the type specimen. Mr. Franklin is one of the outstanding field workers in botany today.

**Penstemon humilis** Nutt var. **desereticus** Welsh, *var. nov.* Similis *P. humilis* var. *humilis* in habitis sed in floribus majoribus et corolla lobis brevioribus et tubis latioribus differt (Plate I: Figure 22).

**TYPE:** USA. **Utah.** Juab County, West flank of the Deep Creek Mountains, Rock Spring Canyon, ca. 7 mi. SSE of Ibapah, T10S, R18W, S19, pinyon-juniper woodland, siliceous gravel, 8 June 1978, *S. Welsh, R. Foster, and J. Henriod 16858* (HOLOTYPE BRY!; six isotypes distributed previously as *P. humilis* Nutt.).

**ADDITIONAL SPECIMENS:** USA. **Utah.** Beaver County, Mountain Home Range, 28.5 mi. S of Garrison, 21 June 1983, *S. Goodrich 18550*; Wah Wah Mountains, Pine Grove Canyon, 27 May 1978, *S. Goodrich & L. Hart 11198*; Indian Peak Range, 16 June 1978, *K. Ostler & D. Anderson 1410*; Indian Peak Range, ca. 7 mi. S of Sawtooth Peak, 26 May 1976, *S. Welsh, K. Taylor, and F. Peabody 13295*. Iron County, Indian Peak Range, Arrowhead Pass, 16 June 1973, *K. Ostler & D. Anderson 1402*. Juab County, Deep Creek Range, Thom's Canyon, 18 June 1977, *A. Holmgren and L. & J. Shultz 16471*; Deep Creek Mountains, T11S, R18W, S10, pinyon-grass community, 8 June 1978, *S. Welsh, R. Foster, and J. Henriod 16919*. Millard County, Tunnel Springs Range, Desert Experimental Range, 23 June 1983, *S. Goodrich 18703*; 15 June 1982, *S. Goodrich 16919*; all BRY!.

Pinyon-juniper and mountain mahogany communities, on dolomite, limestone, and siliceous outcrops and gravels, at 2135 to 2680 m in Beaver, Iron, Juab, Millard, and Tooele counties; a Great Basin (i.e., Deseret) endemic.

## AGAVACEAE

***Yucca vespertina*** (McKelvey) Welsh [based on: *Yucca baccata* Torr. in Emory var. *vespertina* McKelvey, *Yuccas of the SW U.S.* 1: 45. 1938].

This conspicuous component of the Mohave Desert flora stands in marked contrast to its mesic counterpart, *Y. baccata*. The long, markedly glaucous, stiff, strongly involute or almost folded leaves, flowers suffused in bud with red-brown or red-purple, and colonial habitat set the Mohave yucca apart from the baccate yucca in about the same manner and degree that other species of yucca are distinguished. The plants are remarkable xerophytes, surviving on the very low rainfall and high temperatures of the low elevation deserts. This strongly glaucous phase grows with creosote bush, Joshua tree, blackbrush, bursage, and other warm desert shrubs. By contrast the baccate yucca has green, only relatively stiff, merely concave leaves, wine-colored flower buds, and tend not to be markedly colonial. It is at least moderately mesophytic, occurring at moderate elevations in the pinyon-juniper community and above. The recognition of *Y. vespertina* at specific level seems long overdue.

## LILIACEAE

Specimens of an unusual onion, identified as *A. geyeri*, were noted in *A Utah Flora* (Welsh et al., 1987, p. 803). The collection consisted of a set of 10 duplicates from the northeast margin of the Abajo Mountains in San Juan County. During the interim six additional collections from various parts of the Abajo Mountains demonstrate that the initial specimens were not merely an aberration. They are, therefore, described as follows:

***Allium geyeri*** Wats. var. ***chatterleyi*** Welsh, var. nov. Similis *A. geyeri* var. *geyeri* in propria generaliter sed in bulbis tunicae marcescentibus multistratis et longioribus differt (Plate I: Figure 23).

TYPE: USA. Utah. San Juan County, T32S, R22E, S27, head of Indian Creek Canyon, at ca. 2015 m in pinyon-juniper community on Navajo Sandstone, 2 August 1983, S. L. Welsh, B. T. Welsh, & M. Chatterley 22371 (HOLOTYPE BRY!; isotypes, nine distributed previously as *Allium*).

ADDITIONAL SPECIMENS: Utah. San Juan County, Abajo Mts., Cliff Dweller's Pasture, 27 June 1984, *J. S. Tuhy 1519*; Horse Mountain, 27 June 1991, *M. A. Franklin & B. Thompson 7228*; Trough Canyon, 9 July 1992, *M. Ben Franklin 7559*; Little Dry Mesa, 28 June 1990, *M. A. Franklin & B. Thompson 7235*; Tuerto Canyon, 12 July 1990, *M. A. Franklin 7275*; Chippean Ridge, 11 July 1990, *M.A. Franklin 7275*; all BRY!.

Chatterley's onion. The variety is named in honor of Matthew Chatterley, co-collector of the type. The species complex is described below:

*Allium geyeri* Wats. Bulbs .7–2 cm thick and about as long or longer, ovoid, buried 1–8 cm below ground, the scales fibrous-reticulate, more or less persistent and extending from the root crown to 11 cm up the flowering stem; leaves 2 or 3 per scape, shorter than the scape, 1–5 mm wide, concave-convex; scapes 15–50 cm tall (above ground); spathaceous bracts 2 or 3, mostly 1-veined; umbels 5- to 37-flowered, the pedicels straight or curved; perianth pink or white, 6–10 mm long, the segments subequal, with tips more or less recurved, often replaced by bulblets; stamens included; capsule inconspicuously low-crested.

1. Marcescent bulb scales few layered, extending 2–4 cm up the flowering stem; plants of broad distribution *A. geyeri* var. *geyeri*
- Marcescent bulb scales many layered, extending 4.5–11 cm up the flowering stem base; plants from the Abajo Mts. *A. geyeri* var. *chatterleyi*

Var. *chatterleyi* Welsh Pinyon-juniper, ponderosa pine-manzanita, and mountain mahogany communities in San Juan County (type from head of Indian Creek, *Welsh et al. 22371*, 1983, HOLOTYPE BRY!); endemic.

Var. *geyeri* Pinyon-juniper, ponderosa pine, sagebrush, aspen, grass-forb, and spruce-fir communities, typically in moist sites, at 2105 to 3540 m in Cache, Daggett, Duchesne, Emery, Garfield, Rich, San Juan (La Sal Mts.), Summit, Uintah, and Wasatch counties; British Columbia and Alberta, south to Oregon, Nevada, Arizona, New Mexico, and Texas.

#### ORCHIDACEAE

A decade ago, Sheviak (1984) named a new orchid from Colorado, whose distribution includes portions of Utah and Nevada,

in addition to Colorado. That taxon, *Spiranthes diluvialis*, has received considerable attention during the interim. It was finally listed by the U.S. Fish and Wildlife Service as a threatened species under stipulations of the Endangered Species Act of 1973, as amended. Previously and subsequently the same author has named additional species in the genus (Sheviak, 1973, 1989, 1990). Most of these fit within the concept of *S. romanzoffiana sensu lato*, which had been reported in the literature as having more than one base chromosome number. Those different base chromosome numbers have been used by Sheviak as evidence to support the taxa treated. Careful examination of the several sheets now available for study from Utah have demonstrated that most specimens in the *romanzoffiana* complex can be logically and reasonably segregated into two stacks. There are specimens, however, that are difficult to place into one or the other category. Because of the intermediacy of those specimens and the problematic utilization of features of the lip in dried specimens, it is here proposed that *S. diluvialis* be treated at varietal level.

***Spiranthes romanzoffiana* Cham. var. *diluvialis* (Sheviak) Welsh, *comb. nov.* [based on: *Spiranthes diluvialis* Sheviak, *Brittonia* 36: 11. 1984].**

The species and its varieties in Utah are described below:

*Spiranthes romanzoffiana* Cham. Plant erect, stout to slender, glabrous below, pubescent to almost glabrous above, .8–6 dm tall; roots fleshy, fasciculate; basal leaves 2–4, 3–32 cm long, 2–13 (15) mm wide, linear-oblongate, cauline ones 2–6, greatly reduced and finally bracteate upward; floral bracts ovate- to lance-attenuate; flowers creamy white, 7.5–15 mm long; sepals and petals connivent and forming a hood over the column; sepals lanceolate, 7.5–15 mm long, 3–4 mm wide, the lateral somewhat falcate; petals triangular-attenuate, obtuse, 7.5–15 mm long, 1–2.5 mm wide; lip oblong to pandurate, 7.5–12 mm long, ca. 5 mm wide, constricted at or above the middle, the apex entire or erose, dilated and without papillae, the basal callosities minute to prominent;  $2n = 60, 74$ .

1. Petals free for (3.5) 4.5–6.5 mm; rachis of inflorescence with at least some hairs more than .2 mm long; plants of middle and lower elevations *S. romanzoffiana* var. *diluvialis*
- Petals free for 2–3.5 mm; rachis of inflorescence glabrous or

with very short glandular hairs, mainly less than .1 mm long; plants of middle to upper elevations *S. romanzoffiana* var. *romanzoffiana*

Var. *diluvialis* (Sheviak) Welsh Intermountain ladies-tresses. Wet meadows, stream banks, abandoned oxbow meanders, marshes, and raised bogs at 1370 to 2085 m in Daggett, Duchesne, Garfield, Salt Lake, Tooele, Uintah, Utah, Wayne, and Weber counties; Nevada and Colorado;  $2n = 74$ .

Specimens of this entity vary from clearly identifiable to questionably identifiable. There is no single character or combination of characteristics that will allow for determination of all specimens and, counting of chromosomes is not a practical option. The diagnostic criteria overlap, as do the sizes of the plants and the elevational ranges. Shape of the lip and the presence and degree of development of callosities at the lip base are difficult to discern in dried, pressed material. At least some of the principal habitat is along lake shores and waterways that are privately owned, places not readily available to collectors; certainly it is more abundant than the few specimens extant in herbaria seem to indicate.

Var. *romanzoffiana* Bogs to open woods in lodgepole pine, aspen, spruce-fir, and alpine tundra communities at 1735 to 3310 m in Daggett, Duchesne, Juab, Salt Lake, Summit, Uintah, Utah, Wasatch, and Washington counties; Alaska to Newfoundland and southward to California, Arizona, New Mexico, Michigan, and Pennsylvania;  $2n = 60$ .

Plants of this variety thrive in a heavily grazed wet meadow pasture in Summit County, flowering brightly in a field grazed as close as a lawn. Thus, grazing by itself does not appear to constitute a serious threat to this species.

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